

All four forces without superstrings. (Other game in town)

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Abstract

Electroweak, gluons, and gravity fields arise as gauge fields from probabilities of physical events.

1 Introduction

As is obvious, the strings theory arrives at it's logical finish [1]. But it is possible that Nature is done more simply and more naturally than that. In this article I'm propose the deduction of the electroweak, gluons, and gravity forces from the representation of physical events' probabilities by spinors as "other game in town" [2].

2 Electroweak fields

Let $\langle \rho(\underline{x}), j_1(\underline{x}), j_2(\underline{x}), j_3(\underline{x}) \rangle = \langle \rho(t, \mathbf{x}), \mathbf{j}(t, \mathbf{x}) \rangle$ be a probability density 3+1-vector of any physical event [3].

Complex functions $\varphi_1(\underline{x}), \varphi_2(\underline{x}), \varphi_3(\underline{x}), \varphi_4(\underline{x})$ exist [4] such that

$$\begin{aligned} \rho &= \sum_{s=1}^4 \varphi_s^* \varphi_s, \\ \frac{j_\alpha}{c} &= - \sum_{k=1}^4 \sum_{s=1}^4 \varphi_s^* \beta_{s,k}^{[\alpha]} \varphi_k \end{aligned} \tag{1}$$

for every such density vector. Here $\alpha \in \{1, 2, 3\}$ and $\beta^{[\alpha]}$ - are diagonal elements of the light Clifford's pentad [5].

If

$$\varphi = \begin{bmatrix} \varphi_1 \\ \varphi_2 \\ \varphi_3 \\ \varphi_4 \end{bmatrix}$$

then [6]

$$\frac{1}{c}\partial_t\varphi + \left(\mathbf{i}\Theta_0 + \mathbf{i}\Upsilon_0\gamma^{[5]}\right)\varphi = \begin{pmatrix} \beta^{[1]}\partial_1 + \mathbf{i}\Theta_1\beta^{[1]} + \mathbf{i}\Upsilon_1\beta^{[1]}\gamma^{[5]} + \\ +\beta^{[2]}\partial_2 + \mathbf{i}\Theta_2\beta^{[2]} + \mathbf{i}\Upsilon_2\beta^{[2]}\gamma^{[5]} + \\ +\beta^{[3]}\partial_3 + \mathbf{i}\Theta_3\beta^{[3]} + \mathbf{i}\Upsilon_3\beta^{[3]}\gamma^{[5]} + \\ +\mathbf{i}M_0\gamma^{[0]} + \mathbf{i}M_4\beta^{[4]} - \\ -\mathbf{i}M_{\zeta,0}\gamma_{\zeta}^{[0]} + \mathbf{i}M_{\zeta,4}\zeta^{[4]} - \\ -\mathbf{i}M_{\eta,0}\gamma_{\eta}^{[0]} - \mathbf{i}M_{\eta,4}\eta^{[4]} + \\ +\mathbf{i}M_{\theta,0}\gamma_{\theta}^{[0]} + \mathbf{i}M_{\theta,4}\theta^{[4]} \end{pmatrix} \varphi. \quad (2)$$

with real Θ_k , Υ_k , M_0 , M_4 , $M_{\zeta,0}$, $M_{\zeta,4}$, $M_{\eta,0}$, $M_{\eta,4}$, $M_{\theta,0}$, $M_{\theta,4}$ and

$$\gamma^{[5]} \stackrel{def}{=} \begin{bmatrix} 1_2 & 0_2 \\ 0_2 & -1_2 \end{bmatrix}, \quad (3)$$

here $\gamma^{[0]}$, $\beta^{[4]}$ are antidiagonal elements of the light Clifford's pentad, and $\gamma_{\zeta}^{[0]}$, $\zeta^{[4]}$, $\gamma_{\eta}^{[0]}$, $\eta^{[4]}$, $\gamma_{\theta}^{[0]}$, $\theta^{[4]}$ are antidiagonal elements of colored Clifford's pentads [7].

If $M_{\zeta,0} = 0$, $M_{\zeta,4} = 0$, $M_{\eta,0} = 0$, $M_{\eta,4} = 0$, $M_{\theta,0} = 0$, $M_{\theta,4} = 0$ then the Dirac lepton moving equation is derived from (2):

$$\left(\mathbf{i}\frac{1}{c}\partial_t - \Theta_0 - \Upsilon_0\gamma^{[5]}\right)\varphi = \sum_{k=1}^3 \left(\beta^{[k]} \left(\mathbf{i}\partial_k - \Theta_k - \Upsilon_k\gamma^{[5]}\right) - m\gamma\right)\varphi \quad (4)$$

with $m = \sqrt{M_0^2 + M_4^2}$ and $\gamma = \left(\frac{M_0}{\sqrt{M_0^2 + M_4^2}}\gamma^{[0]} + \frac{M_4}{\sqrt{M_0^2 + M_4^2}}\beta^{[4]}\right)$.

Let x_4 , x_5 be some real variables such that

$$-\frac{\pi c}{h} \leq x_5 \leq \frac{\pi c}{h}, -\frac{\pi c}{h} \leq x_4 \leq \frac{\pi c}{h}.$$

and let

$$\begin{aligned} &\tilde{\varphi}(t, x_1, x_2, x_3, x_5, x_4) \stackrel{def}{=} \varphi(t, x_1, x_2, x_3) \cdot \\ &\cdot (\exp(\mathbf{i}(x_5 M_0(t, x_1, x_2, x_3) + x_4 M_4(t, x_1, x_2, x_3)))) \cdot \end{aligned}$$

In this case $\tilde{\varphi}$ obeys to the following moving equation:

$$\left(\sum_{s=0}^3 \beta^{[s]} \left(i\partial_s - \Theta_s - \Upsilon_s \gamma^{[5]} \right) - \gamma^{[0]} i\partial_5 - \beta^{[4]} i\partial_4 \right) \tilde{\varphi} = 0$$

(here $\beta^{[0]} = -1$).

This equation can be transformed to the following form [8]:

$$\left(\sum_{s=0}^3 \beta^{[s]} (i\partial_s + F_s + 0.5g_1 Y B_s) - \gamma^{[0]} i\partial_5 - \beta^{[4]} i\partial_4 \right) \tilde{\varphi} = 0 \quad (5)$$

with real F_s , B_s , real positive g_1 , and with the charge matrix¹ :

$$Y \stackrel{def}{=} - \begin{bmatrix} 1_2 & 0_2 \\ 0_2 & 2 \cdot 1_2 \end{bmatrix}. \quad (6)$$

If $\chi(t, x_1, x_2, x_3)$ is a real function and:

$$\tilde{U}(\chi) \stackrel{def}{=} \begin{bmatrix} \exp(i\frac{\chi}{2}) 1_2 & 0_2 \\ 0_2 & \exp(i\chi) 1_2 \end{bmatrix}. \quad (7)$$

then equation (5) is invariant for the following transformations:

$$\begin{aligned} x_4 &\rightarrow x'_4 = x_4 \cos \frac{\chi}{2} - x_5 \sin \frac{\chi}{2}; \\ x_5 &\rightarrow x'_5 = x_5 \cos \frac{\chi}{2} + x_4 \sin \frac{\chi}{2}; \\ x_\mu &\rightarrow x'_\mu = x_\mu \text{ for } \mu \in \{0, 1, 2, 3\}; \\ \tilde{\varphi} &\rightarrow \tilde{\varphi}' = \tilde{U} \tilde{\varphi}, \\ B_\mu &\rightarrow B'_\mu = B_\mu - \frac{1}{g_1} \partial_\mu \chi, \\ F_\mu &\rightarrow F'_\mu = \tilde{U} F_s \tilde{U}^\dagger. \end{aligned} \quad (8)$$

Therefore, B_μ are components of the Standard Model gauge field B .

Further $\mathfrak{J}_{\mathbf{J}}$ be [10], [11] the space spanned of the following basis [12]:

$$\mathbf{J} \stackrel{def}{=} \left\langle \begin{array}{l} \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(s_0 x_4)\right) \epsilon_1, \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(s_0 x_4)\right) \epsilon_2, \\ \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(s_0 x_4)\right) \epsilon_3, \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(s_0 x_4)\right) \epsilon_4, \\ \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(n_0 x_5)\right) \epsilon_1, \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(n_0 x_5)\right) \epsilon_2, \\ \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(n_0 x_5)\right) \epsilon_3, \frac{\hbar}{2\pi c} \exp\left(-i\frac{\hbar}{c}(n_0 x_5)\right) \epsilon_4 \end{array} \right\rangle \quad (9)$$

¹I denote $n \times n$ matrices:

$$1_n \stackrel{def}{=} \begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & \cdots & 1 \end{bmatrix}, 0_n \stackrel{def}{=} \begin{bmatrix} 0 & 0 & \cdots & 0 \\ 0 & 0 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & \cdots & 0 \end{bmatrix}.$$

with some integer numbers s_0 and n_0 and with

$$\epsilon_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \cdot\epsilon_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \cdot\epsilon_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \cdot\epsilon_4 = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}.$$

Farther U be any linear transformation of space $\mathfrak{S}_{\mathbf{J}}$ such that for every $\tilde{\varphi}$: if $\tilde{\varphi} \in \mathfrak{S}_{\mathbf{J}}$ then:

$$\begin{aligned} (U\tilde{\varphi})^\dagger (U\tilde{\varphi}) &= \rho, \\ (U\tilde{\varphi})^\dagger \beta^{[s]} (U\tilde{\varphi}) &= -\frac{j \cdot s}{c} \end{aligned} \quad (10)$$

for $s \in \{1, 2, 3\}$.

Matrix U factorized as the following [13]:

$$U = \exp(i\varsigma) \tilde{U} U^{(-)} U^{(+)}$$

with real ς and with

$$U^{(+)} \stackrel{def}{=} \begin{bmatrix} 1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & (u + iv) 1_2 & 0_2 & (k + is) 1_2 \\ 0_2 & 0_2 & 1_2 & 0_2 \\ 0_2 & (-k + is) 1_2 & 0_2 & (u - iv) 1_2 \end{bmatrix} \quad (11)$$

and

$$U^{(-)} \stackrel{def}{=} \begin{bmatrix} (a + ib) 1_2 & 0_2 & (c + iq) 1_2 & 0_2 \\ 0_2 & 1_2 & 0_2 & 0_2 \\ (-c + iq) 1_2 & 0_2 & (a - ib) 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 1_2 \end{bmatrix} \quad (12)$$

with real a, b, c, q, u, v, k, s .

Matrix $U^{(+)}$ refers to antiparticles [14]. And transformation $U^{(-)}$ reduces equation (5) to the following shape [15]:

$$\left(\begin{array}{c} \sum_{\mu=0}^3 \beta^{[\mu]} i (\partial_\mu - i0.5g_1 B_\mu Y - i\frac{1}{2}g_2 W_\mu - iF_\mu) \\ + \gamma^{[0]} i \partial_5 + \beta^{[4]} i \partial_4 \end{array} \right) \tilde{\varphi} = 0. \quad (13)$$

with real positive g_2 and with

$$W_\mu = \begin{bmatrix} W_{0,\mu} 1_2 & 0_2 & (W_{1,\mu} - iW_{2,\mu}) 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \\ (W_{1,\mu} + iW_{2,\mu}) 1_2 & 0_2 & -W_{0,\mu} 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \end{bmatrix}$$

with real $W_{0,\mu}, W_{1,\mu}$ and $W_{2,\mu}$.

Equation (13) is invariant under the following transformation [16]:

$$\begin{aligned}
\varphi &\rightarrow \varphi' = U\varphi, \\
x_4 &\rightarrow x'_4 = (\ell_o + \ell_*) ax_4 + (\ell_o - \ell_*) \sqrt{1-a^2}x_5, \\
x_5 &\rightarrow x'_5 = (\ell_o + \ell_*) ax_5 - (\ell_o - \ell_*) \sqrt{1-a^2}x_4, \\
x_\mu &\rightarrow x'_\mu = x_\mu, \text{ for } \mu \in \{0, 1, 2, 3\}, \\
B_\mu &\rightarrow B'_\mu = B_\mu, \\
W_\mu &\rightarrow W'_\mu = UW_\mu U^\dagger - \frac{2i}{g_2} (\partial_\mu U) U^\dagger
\end{aligned} \tag{14}$$

with [17]

$$\begin{aligned}
\ell_o &\stackrel{def}{=} \frac{1}{2\sqrt{(1-a^2)}} \begin{bmatrix} (b + \sqrt{(1-a'^2)}) 1_4 & (q - ic) 1_4 \\ (q + ic) 1_4 & (\sqrt{(1-a^2)} - b) 1_4 \end{bmatrix}, \\
\ell_* &\stackrel{def}{=} \frac{1}{2\sqrt{(1-a^2)}} \begin{bmatrix} (\sqrt{(1-a^2)} - b) 1_4 & (-q + ic) 1_4 \\ (-q - ic) 1_4 & (b + \sqrt{(1-a^2)}) 1_4 \end{bmatrix}.
\end{aligned}$$

Hence W_μ behaves as components of the weak field W of Standard Model. Field $W_{0,\mu}$ obeys the following equation [18]:

$$\left(-\frac{1}{c^2} \partial_t^2 + \sum_{s=1}^3 \partial_s^2 \right) W_{0,\mu} = g_2^2 \left(\widetilde{W}_0^2 - \widetilde{W}_1^2 - \widetilde{W}_2^2 - \widetilde{W}_3^2 \right) W_{0,\mu} + \Lambda \tag{15}$$

with

$$\widetilde{W}_\nu = \begin{bmatrix} W_{0,\nu} \\ W_{1,\nu} \\ W_{2,\nu} \end{bmatrix}$$

and Λ is the action of other components of field W on $W_{0,\mu}$.

Equation (15) looks like to the Klein-Gordon equation of field $W_{0,\mu}$ with mass

$$m = \frac{h}{c} g_2 \sqrt{\widetilde{W}_0^2 - \sum_{s=1}^3 \widetilde{W}_s^2} \tag{16}$$

and with additional terms of the $W_{0,\mu}$ interactions with others components of \widetilde{W} . Fields $W_{1,\mu}$ and $W_{2,\mu}$ have similar equations.

The "mass" (16) is invariant [19] under the Lorentz transformations

$$\widetilde{W}'_0 \stackrel{def}{=} \frac{\widetilde{W}_0 - \frac{v}{c} \widetilde{W}_k}{\sqrt{1 - (\frac{v}{c})^2}}, \quad \widetilde{W}'_k \stackrel{def}{=} \frac{\widetilde{W}_k - \frac{v}{c} \widetilde{W}_0}{\sqrt{1 - (\frac{v}{c})^2}}, \quad \widetilde{W}'_k \stackrel{def}{=} \widetilde{W}_k, \text{ if } s \neq k,$$

is invariant under the turns of the $\langle \widetilde{W}_1, \widetilde{W}_2, \widetilde{W}_3 \rangle$ space

$$\left\{ \begin{array}{l} \widetilde{W}'_r = \widetilde{W}_r \cos \lambda - \widetilde{W}_s \sin \lambda. \\ \widetilde{W}'_s = \widetilde{W}_r \sin \lambda + \widetilde{W}_s \cos \lambda; \end{array} \right|$$

and invariant under a global weak isospin transformation U :

$$W_\nu \rightarrow W'_\nu = U^{(-)} W_\nu U^{(-)\dagger},$$

but is not invariant for a local transformation $U^{(-)}$. But local transformations for $W_{0,\mu}$, $W_{1,\mu}$ and $W_{2,\mu}$ is insignificant since all three particles are very short-lived.

That is the form (16) varies in space, but locally acts like a mass - i.e. it does not allow to particles of this field to behave as a massless ones.

If

$$\begin{aligned} Z_\mu &\stackrel{def}{=} (W_{0,\mu} \cos \alpha - B_\mu \sin \alpha), \\ A_\mu &\stackrel{def}{=} (B_\mu \cos \alpha + W_{0,\mu} \sin \alpha) \end{aligned}$$

with

$$\alpha \stackrel{def}{=} \arctan \frac{g_1}{g_2}$$

then masses of Z and W fulfill to the following ratio [20]:

$$m_Z = \frac{m_W}{\cos \alpha}.$$

If

$$e \stackrel{def}{=} \frac{g_1 g_2}{\sqrt{g_1^2 + g_2^2}},$$

and

$$\widehat{Z}_\mu \stackrel{def}{=} Z_\mu \frac{1}{\sqrt{g_2^2 + g_1^2}} \begin{bmatrix} (g_2^2 + g_1^2) 1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 2g_1^2 1_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & (g_2^2 - g_1^2) 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 2g_1^2 1_2 \end{bmatrix},$$

$$\widehat{W}_\mu \stackrel{def}{=} g_2 \begin{bmatrix} 0_2 & 0_2 & (W_{1,\mu} - iW_{2,\mu}) 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \\ (W_{1,\mu} + iW_{2,\mu}) 1_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 0_2 \cdot 1_2 \end{bmatrix},$$

$$\widehat{A}_\mu \stackrel{def}{=} A_\mu \begin{bmatrix} 0_2 & 0_2 & 0_2 & 0_2 \\ 0_2 & 1_2 & 0_2 & 0_2 \\ 0_2 & 0_2 & 1_2 & 0_2 \\ 0_2 & 0_2 & 0_2 & 1_2 \end{bmatrix}.$$

then equation (13) has got the following form [21]:

$$\left(\sum_{\mu=0}^3 \beta^{[\mu]} i \left(\partial_\mu + ie \widehat{A}_\mu - i0.5 \left(\widehat{Z}_\mu + \widehat{W}_\mu \right) \right) + \gamma^{[0]} i \partial_5 + \beta^{[4]} i \partial_4 \right) \widetilde{\varphi} = 0. \quad (17)$$

Here the vector field A_μ is *the electromagnetic potential*, and $\left(\widehat{Z}_\mu + \widehat{W}_\mu \right)$ is *the weak potential*.

3 Gluons fields

If

$$U_{1,2}(\alpha) = \cos \frac{\alpha}{2} \cdot 1_4 - \sin \frac{\alpha}{2} \cdot \beta^{[1]} \beta^{[2]}$$

then equation (4) is invariant under the following turning transformations [22]:

$$\begin{aligned} \widetilde{\varphi} &\rightarrow \widetilde{\varphi}' = U_{1,2}(\alpha) \widetilde{\varphi}, \\ x_0 &\rightarrow x'_0 = x_0, \\ x_1 &\rightarrow x'_1 = x_1 \cos \alpha - x_2 \sin \alpha, \\ x_2 &\rightarrow x'_2 = x_1 \sin \alpha + x_2 \cos \alpha, \\ x_3 &\rightarrow x'_3 = x_3, \\ \Theta_0 &\rightarrow \Theta'_0 = \Theta_0, \\ \Theta_1 &\rightarrow \Theta'_1 = \Theta_1 \cos \alpha - \Theta_2 \sin \alpha, \\ \Theta_2 &\rightarrow \Theta'_2 = \Theta_1 \sin \alpha + \Theta_2 \cos \alpha, \\ \Theta_3 &\rightarrow \Theta'_3 = \Theta_3, \\ \Upsilon_0 &\rightarrow \Upsilon'_0 = \Upsilon_0, \\ \Upsilon_1 &\rightarrow \Upsilon'_1 = \Upsilon_1 \cos \alpha - \Upsilon_2 \sin \alpha, \\ \Upsilon_2 &\rightarrow \Upsilon'_2 = \Upsilon_1 \sin \alpha + \Upsilon_2 \cos \alpha, \\ \Upsilon_3 &\rightarrow \Upsilon'_3 = \Upsilon_3, \\ M_0 &\rightarrow M'_0 = M_0, \\ M_4 &\rightarrow M'_4 = M_4, \end{aligned} \quad (18)$$

and is invariant under all other turnings of Cartesian system [23].

But under such rotation the mass members of colored pentads of equation (2) are interfused [24]:

$$\begin{aligned} M'_{\zeta,0} \cos \alpha + M'_{\eta,0} \sin \alpha &= M_{\zeta,0}, \\ M'_{\zeta,4} \cos \alpha + M'_{\eta,4} \sin \alpha &= M_{\zeta,4}, \\ M'_{\eta,0} \cos \alpha - M'_{\zeta,0} \sin \alpha &= M_{\eta,0}, \\ M'_{\eta,4} \cos \alpha - M'_{\zeta,4} \sin \alpha &= M_{\eta,4}, \\ M'_{\theta,0} &= M_{\theta,0}, \\ M'_{\theta,4} &= M_{\theta,4}. \end{aligned}$$

The mass members of colored pentads are interfused under other Cartesian rotations, too.

Therefore the chromatic triplet elements can not be separated in space. These elements must be *confined* into identical place (*confinement*).

Each chromatic pentad contains two mass elements. Hence, every family contains two sorts of the chromatic particles of tree colors. These particles are quarks.

The hamiltonian of form:

$$\begin{aligned} \widehat{H}_{clr} \stackrel{def}{=} & \sum_{s=1}^3 \beta^{[s]} (i\partial_s + F_s) + \\ & + M_{\zeta,0} \gamma_{\zeta}^{[0]} - M_{\zeta,4} \zeta^{[4]} + M_{\eta,0} \gamma_{\eta}^{[0]} + M_{\eta,4} \eta^{[4]} - M_{\theta,0} \gamma_{\theta}^{[0]} - M_{\theta,4} \theta^{[4]}. \end{aligned} \quad (19)$$

can be formulated as the following:

$$\widehat{H}_{clr} = \sum_{s=1}^3 3[\widehat{\beta}^{[s]} (i\partial_s + F_s) + 3[\widehat{M}], \quad (20)$$

here $[$ is the left bracket of the product K-matrices designation [25], \widehat{M} is a K-matrix such that:

$$\widehat{M} \stackrel{def}{=} \left\| \begin{array}{ccc} (M_{\zeta,0} - \widehat{i}M_{\zeta,4}) \gamma_{\zeta}^{[0]} & 0_4 & 0_4 \\ 0_4 & (M_{\eta,0} + \widehat{i}M_{\eta,4}) \gamma_{\eta}^{[0]} & 0_4 \\ 0_4 & 0_4 & (-M_{\theta,0} - \widehat{i}M_{\theta,4}) \gamma_{\theta}^{[0]} \end{array} \right\| \quad (21)$$

with

$$\widehat{i} \stackrel{def}{=} i\gamma^{[5]} = \begin{bmatrix} i & 0 & 0 & 0 \\ 0 & i & 0 & 0 \\ 0 & 0 & -i & 0 \\ 0 & 0 & 0 & -i \end{bmatrix},$$

$$\widehat{\beta}^{[1]} \stackrel{def}{=} \left\| \begin{array}{ccc} \zeta^{[1]} & 0_4 & 0_4 \\ 0_4 & \eta^{[1]} & 0_4 \\ 0_4 & 0_4 & \theta^{[1]} \end{array} \right\|,$$

$$\widehat{\beta}^{[2]} \stackrel{def}{=} \left\| \begin{array}{ccc} 0_4 & \gamma_{\zeta}^{[0]} \eta^{[2]} \gamma_{\eta}^{[0]} & 0_4 \\ 0_4 & 0_4 & \gamma_{\eta}^{[0]} \theta^{[2]} \gamma_{\theta}^{[0]} \\ \gamma_{\theta}^{[0]} \zeta^{[2]} \gamma_{\zeta}^{[0]} & 0_4 & 0_4 \end{array} \right\|,$$

$$\widehat{\beta}^{[3]} \stackrel{def}{=} \left\| \begin{array}{ccc} 0_4 & 0_4 & \gamma_{\zeta}^{[0]} \theta^{[3]} \gamma_{\theta}^{[0]} \\ \gamma_{\eta}^{[0]} \zeta^{[3]} \gamma_{\zeta}^{[0]} & 0_4 & 0_4 \\ 0_4 & \gamma_{\theta}^{[0]} \eta^{[3]} \gamma_{\eta}^{[0]} & 0_4 \end{array} \right\|.$$

Equation

$$\widehat{H}_{clr}\widetilde{\varphi} = \sum_{s=1}^3 3[\widehat{\beta}^{[s]} (\mathrm{i}\partial_s + F_s) \widetilde{\varphi}] + 3[\widehat{M}\widetilde{\varphi}]. \quad (22)$$

is invariant [26] under the following transformation:

$$\begin{aligned} \widetilde{\varphi} &\rightarrow \widetilde{\varphi}' \stackrel{def}{=} [U\widetilde{\varphi}], \\ \widehat{M} &\rightarrow \widehat{M}' \stackrel{def}{=} [U\widehat{M}U^\dagger], \\ \widehat{\beta}^{[s]} &\rightarrow \widehat{\beta}^{[s]'} \stackrel{def}{=} [U\widehat{\beta}^{[s]}U^\dagger], \\ F_s &\rightarrow F'_s \stackrel{def}{=} (F_s - [(\mathrm{i}\partial_s U)U^\dagger]) \end{aligned} \quad (23)$$

with an unitary 3×3 K-matrix U .

There:

$$[(\mathrm{i}\partial_s U)U^\dagger] = \widehat{\mathrm{i}} \sum_{r=1}^8 \lambda_r g \frac{1}{2} \gamma^{[5]} G_s^r$$

with G_s^r are real, g is a real positive and:

$$U = \exp \left(\widehat{\mathrm{i}} \sum_{r=1}^8 \lambda_r \alpha_r \right)$$

with

$$\lambda_1 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & 1_4 & 0_4 \\ 1_4 & 0_4 & 0_4 \\ 0_4 & 0_4 & 0_4 \end{pmatrix} \right\|, \lambda_2 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & -\widehat{\mathrm{i}} & 0_4 \\ \widehat{\mathrm{i}} & 0_4 & 0_4 \\ 0_4 & 0_4 & 0_4 \end{pmatrix} \right\|, \lambda_3 \stackrel{def}{=} \left\| \begin{pmatrix} 1_4 & 0_4 & 0_4 \\ 0_4 & -1_4 & 0_4 \\ 0_4 & 0_4 & 0_4 \end{pmatrix} \right\|,$$

$$\lambda_4 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & 0_4 & 1_4 \\ 0_4 & 0_4 & 0_4 \\ 1_4 & 0_4 & 0_4 \end{pmatrix} \right\|, \lambda_5 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & 0_4 & -\widehat{\mathrm{i}} \\ 0_4 & 0_4 & 0_4 \\ \widehat{\mathrm{i}} & 0_4 & 0_4 \end{pmatrix} \right\|, \lambda_6 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & 0_4 & 0_4 \\ 0_4 & 0_4 & 1_4 \\ 0_4 & 1_4 & 0_4 \end{pmatrix} \right\|,$$

$$\lambda_7 \stackrel{def}{=} \left\| \begin{pmatrix} 0_4 & 0_4 & 0_4 \\ 0_4 & 0_4 & -\widehat{\mathrm{i}} \\ 0_4 & \widehat{\mathrm{i}} & 0_4 \end{pmatrix} \right\|, \lambda_8 \stackrel{def}{=} \frac{1}{\sqrt{3}} \left\| \begin{pmatrix} 1_4 & 0_4 & 0_4 \\ 0_4 & 1_4 & 0_4 \\ 0_4 & 0_4 & -2 \cdot 1_4 \end{pmatrix} \right\|.$$

Here G_s^r are *the gluon fields*.

4 Gravity fields

Equation (2) can be reformed as the following [27]:

$$\begin{pmatrix} \beta^{[0]} (\partial_0 + i\Theta_0 + i\Upsilon_0\gamma^{[5]} - iM_0\gamma^{[0]} - iM_4\beta^{[4]}) \\ +\beta^{[1]} (\partial_1 + i\Theta_1 + i\Upsilon_1\gamma^{[5]} + M_{\zeta,0}\beta^{[4]} - M_{\zeta,4}\gamma^{[0]}) \\ +\beta^{[2]} (\partial_2 + i\Theta_2 + i\Upsilon_2\gamma^{[5]} + M_{\eta,0}\beta^{[4]} + M_{\eta,4}\gamma^{[0]}) \\ +\beta^{[3]} (\partial_3 + i\Theta_3 + i\Upsilon_3\gamma^{[5]} - M_{\theta,0}\beta^{[4]} - M_{\theta,4}\gamma^{[0]}) \end{pmatrix} \varphi = 0.$$

Therefore the leptons mass members M_0 , M_4 and the quarks mass members $M_{\zeta,0}$, $M_{\zeta,4}$, $M_{\eta,0}$, $M_{\eta,4}$, $M_{\theta,0}$, $M_{\theta,4}$ form a field

$$\mathcal{G}(M_0, M_4, M_{\zeta,0}, M_{\zeta,4}, M_{\eta,0}, M_{\eta,4}, M_{\theta,0}, M_{\theta,4})$$

which acts as other gauge fields Θ and $\Upsilon\gamma^{[5]}$. Since \mathcal{G} is defined by values of masses then this field is *the gravity field*.

5 Conclusion

Thus, all four forces arise from the representation of physical events' probabilities by spinors. And all physics events are interpreted by these four forces. Superstrings are not necessary.

A researcher obtains from Nature only probabilities of physical events. But these probabilities give only the known by this time particles (leptons, quarks) and the known by this time gauge fields (electroweak, gluons, gravity) [28]. Therefore, if anybody shall assert that he found a super or he found a Higgs then this assertion is false because all these events² can be interpreted by leptons, quarks, and by electroweak, gluons, gravity fields.

References

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- [2] Idem, p.29
- [3] Gunn Quznetsov, *Probabilistic Treatment of Gauge Theories*, in series Contemporary Fundamental Physics, ed. V. Dvoeglazov, Nova Sci. Publ. Inc., NY (2007), p. 38; G. Quznetsov, *Logical Foundation of Theoretical Physics*, Nova Sci. Publ. Inc., NY, (2006), p. 80
- [4] Gunn Quznetsov, *Probabilistic Treatment of Gauge Theories*, in series Contemporary Fundamental Physics, ed. V. Dvoeglazov, Nova Sci. Publ. Inc., NY (2007), p.39-41

²and a dark energy and a dark matter, may be, too

- [5] Idem., p.38 (formula (2.1))
- [6] Idem., p.61 (formula (2.27))
- [7] Idem, p.39 (formulas 2.2, 2.3, 2.5, 2.7, 2.9)
- [8] Idem, p.62
- [9] Idem, p.64 (formula 2.34)
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- [12] Gunn Quznetsov, *Probabilistic Treatment of Gauge Theories*, in series Contemporary Fundamental Physics, ed. V. Dvoeglazov, Nova Sci. Publ. Inc., NY (2007), p.95
- [13] Idem, p.96-98
- [14] Idem, p.91-94
- [15] Idem, p.129
- [16] Idem, p.121
- [17] Idem, p.98
- [18] Idem, p.127
- [19] Idem, p.127-128
- [20] Idem, p.129
- [21] Idem, p.131
- [22] Idem, p.137
- [23] Idem, p.136
- [24] Idem, p.138
- [25] Idem, p.140-146
- [26] Idem, p.150-152

- [27] Idem, p.155
- [28] Gunn Quznetsov, *Probabilistic Treatment of Gauge Theories*, in series Contemporary Fundamental Physics, ed. V. Dvoeglazov, Nova Sci. Publ. Inc., NY (2007); G. Quznetsov, *Logical Foundation of Theoretical Physics*, Nova Sci. Publ. Inc., NY, (2006)